

Claims

1. A method for materials processing by means of plasma-inducing high-energy radiation, especially laser radiation, in which the instantaneous intensity of the plasma radiation is measured at plural locations of a vapor capillary, **characterized in that** shapes of two spaced-apart peak-intensity regions (10, 12) of the plasma radiation, or of another type of electromagnetic radiation emitted from the vapor capillary, and of a minimum region (11) that can be formed between these two regions of extreme values are detected metrologically, metrologically detected shapes of the regions of extreme values are compared with predetermined region shapes, and control of the materials processing operation takes place as a function of deviations of the detected shapes from the predetermined region shapes.
  2. The method as recited in claim 1, **characterized in that** control of the materials processing operation takes place when the shape of the minimum region (11) deviates from a predetermined near-circular region shape.
- The method as recited in claim 1 or 2, **characterized in that** control of the materials processing operation takes place when there are sharp regional boundaries in the regions (10', 12') of transition from the shape of the minimum region (11) to the shapes of the peak regions (10, 12).
4. The method as recited in one or more of claims 1 to 3, **characterized in that** control of the materials processing operation takes place when the shape of one of the three regions of extreme values deviates from a predetermined region shape.
  5. The method as recited in one or more of claims 1 to 4, **characterized in that** control of the materials processing operation takes place when the shape of a peak-intensity region (10) that is in a leading position, in the feed direction (14), with respect to a workpiece moving relative to the laser radiation and the shape of the trailing peak region (12) deviate from predetermined region shapes.

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6. The method as recited in one or more of claims 1 to 5, **characterized in that** control of the materials processing operation takes place when the deviation in shape exceeds a predetermined difference magnitude and/or a predetermined duration.
7. The method as recited in one or more of claims 1 to 6, **characterized in that** control of the materials processing operation takes place as a function of angular positions assumed by a straight line (13) passing through the peak-intensity regions (10, 12) relative to a feed direction (14) of a workpiece being processed and moving relative to the laser radiation.
8. The method as recited in one or more of claims 1 to 7, **characterized in that** control of the materials processing operation takes place when sporadically occurring, intensely radiating light spots (22) are detected in a region of measurement that is metrologically detecting the shapes of the regions of extreme values.
9. The method as recited in one or more of claims 1 to 8, **characterized in that** control of the materials processing of workpieces of different thicknesses takes place when the minimum region (11) deforms the peak region (10, 12) that is in the leading or the trailing position in the feed direction.
10. The method as recited in one or more of claims 1 to 9, **characterized in that** control of the materials processing operation takes place when two submaxima (15, 16) present on both sides of a joint path in a peak region (10) that is in the leading position in the feed direction deviate from a predetermined symmetry.

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